SNAP Spectrograph Office Meeting

Progress Report n°5

CR of the Berkeley workshop from 9 to 13 Dec:

We had meeting from the 9 to the 13 December, a lot of discussions and a summary meeting on Friday to conclude on work to be done and technical modifications. Here are the main conclusions:
All documents and presentations can be found (or will be put soon) in
http://astrsp-mrs.fr/snap/spectro/spectro.html

- Optic:

Solution with only 7 mirrors was presented with same global transmission.
Visible detector is currently inside the spectrograph to reduce emergence angles. Try to put it outside the spectrograph as polarization for SN is given at the level of 5 % and is not an issue for the spectrograph design.

- Mechanic

Lot of discussions on positioning and material choice. Final main characteristics are:
Spectrograph length goal: < 400 mm
Optical fibbers will be defined after the spectrograph implementation
Thermal link was agreed
Kinematic three points mount on the base plate with control of the focus *(e.g* free material choice)
Spectrograph weight 15 Kg

- Shielding

Plan to have a global and a local shielding around the detectors.
Shielding on detector only is not possible as it can't be a 4 π coverage. The complete shielding will be defined with the global structure. The first analysis will be done by LBL

- Thermalstudies

Study was done by LBNL to estimate the possible operating temperature of the spectrograph detector:
IR sensor power consumption was estimated at 8 mW, 30 mW with the electronic.
Temperature IR sensor at 100 K seems reasonably possible and 70 K difficult. This will limit ate the detector choice.

- Detector

CCD: because of radiation rate, the spectrograph can't use large pixel: we will try to reduce pixel size to 9x9 µm2 / 100 µm thickness. Feasibility will be checked by LBL; New specifications will be provided, franging?

HgCdTe: if we can, do a first test bench with a test detector at 1.7 µm (if around 100k$). For scientific point of view a 1.9µm cut off will be better for the science (to measure the complete Si line at large redshift). Need first to check the operating temperature. Secondly it can be better to benefit of the SNAP detector characterisation process to have the best performances in the spectrograph.

- Electronic

The imager will not use an up the ramp solution. This will be definitely a difference with the spectrograph.
Exposure time will be different (300 s for the imager, 1000 s for the spectrograph)

- Interface

Observation scenarios should be defined
As the imager and the spectrograph will have not the same exposure time, scheduling of simultaneous data taking has to be studied.
SNAP prefers the spectrograph software to be integrated in the common OCU and the hardware control in charge of the French team.
Data acquisition: data go in a common memory system; the compression is taking in charge by the memory system

- Redundancy

The only single point failure of the spectrograph is the detectors.
To avoid it, it was decided to implement fixed dual detectors and a field of view of 3”x6”.
There is no other mechanism to be duplicated (no more focus mechanism or shutter, see next point) in the spectrograph. The dithering mechanism is the only moving element but it is not a failure point.

- Calibration

The scenario of the spectrograph calibration can well match the imager calibration:
It seems possible to use the broad imager lamp (with optical fibber) for flat fielding and wavelength calibration and to put lines using gas lamp or Fabry-Perot. We need to have an internal calibration bench only for cross checking with ground calibration. This has the good advantage to remove the spectrograph shutter and to use the imager one for stars, and this shutter back illumined for lamp usage.
Common calibration mode with imager need to be defined

- Simulation

Continue effort there, need to study the PSF shape carefully in function of the design.

<u>**Next Progress meeting**</u>: 15/01/03